Wenwan Zhong, Ph.D.

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A. Education/Training

INSTITUTION AND LOCATION	DEGREE /TRAINING	MM/YY	FIELD OF STUDY
University of Science & Technology of China	B.S.	07/98	Chemistry
Iowa State University	Ph.D.	07/03	Analytical Chemistry
Los Alamos National Laboratory	Postdoctoral	06/06	Bioanalytical Chemistry

B. Positions and Honors

Positions and Employment

2003-2006 Post-doctoral Research Associate,
Chemistry Division, Los Alamos National Lab

2006-2012 Assistant Professor,
Department of Chemistry, University of California, Riverside

2012-2016 Associate Professor,
Department of Chemistry, University of California, Riverside

2016-present Professor,
Department of Chemistry, University of California, Riverside

2018-present Director,
Environmental Toxicology Graduate Program, UC Riverside

Honors and Awards

2005 Los Alamos Achievement Award

2011 National Science Foundation CAREER Award

2019 UCR Chancellor's Award for Excellence in Undergraduate Research

C. Peer-Reviewed Publications

Brief Summary of Research Areas

My research is devoted to develop innovative bioanalytical techniques to advance our understanding on functions of biomolecules and to improve disease diagnosis and treatment. My group employs several chemical tools, such as synthetic receptors, functional nucleic acids, and nanomaterials, and combines them with analytical techniques like flow cytometry, open-channel separation, microfluidics, optical spectroscopy, and mass spectrometry, for discovery, detection, and analysis of potential biomarkers which may reflect disease initiation and progression, or indicate adverse impacts from environmental pollutants. Our research has three current focuses: 1) Rapid processing and detection of cell-free biomarkers from biospecimens for clinical applications; 2) Discovery of novel probes for epigenetic factors like histone post-translational modification and DNA methylation to study and/or control their biological functions in vitro and in vivo; and 3) Study of the nano-bio interface to guide sustainable design and applications of nanomaterials.

At the University of California, Riverside (*Corresponding Author)

C-1. Y. Liu, A. D. Gill, Y. Duan, L. Perez, **R. J. Hooley**,* **W. Zhong.*** A Supramolecular Sensor Array for Selective Immunoglobulin Deficiency Analysis. *Chemical Communications*. 2019, 10.1039/C9CC06064B

C-2. Y. Wang, M. Trinh, Y. Zheng, K. Guo, L. Jimenez, **W. Zhong.*** Analysis of circulating non-coding RNAs in a non-invasive and cost-effective manner. *Trends in Analytical Chemistry*. 2019, In press.

C-3. Y. Duan, Y. Liu, R. Coreas, **W. Zhong.*** Mapping Molecular Structure of Protein Locating on Nanoparticles with Limited Proteolysis. *Analytical Chemistry*, 2019, 91, 6, 4204-4212.

C-4. X. Fang, Y. Zheng, Y. Duan, Y. Liu, **W. Zhong.*** Recent Advances in Design of Fluorescence-Based Assays for High-Throughput Screening. *Analytical Chemistry*, 2019, 91, 482-504.

C-5. J. Lee, R. Coreas, **W. Zhong.*** Open-channel Separation Techniques for the Characterization of Nanomaterials and the Study of their Interactions. *Characterization Tools for Nanotechnology-based Tissue Engineering and Medical Therapy*. Editor: Challa Kumar. Springer.

C-6. Y. Liu, Y. Duan, A. D. Gill, L. Perez, Q. Jiang, R. J. Hooley*, and **W. Zhong***. Metal-Assisted Selective Recognition of Biothiols by a Synthetic Receptor Array. *Chemical Communications,* 2018, 54,13147-13150.

C-7. L. Perez, A. D. Gill, I. N.Q. Salinas, S. R. Byers, Y. Liu, B. L. Hickey, **W. Zhong** and R. J. Hooley*. Selective Array-based Sensing of Anabolic Steroids in Aqueous Solution by Host:Guest Reporter Complexes. *Chemistry, A European Journal*, 2018, doi.org/10.1002/chem.201804854.

C-8. Y. Liu, J. Lee, L. Perez, A. D. Gill, R. J. Hooley*, and **W. Zhong***. Selective Sensing of Phosphorylated Peptides and In Situ Monitoring of Kinase and Phosphatase Activity with a Supramolecular Tandem Assay. *Journal of American Chemical Society*, 2018, 140, 13869–13877.

C-9. W. Shen, K. Guo, G. B. Adkins, Q. Jiang, Y. Liu, S. Sedano, Y. Duan, W. Yan, S. E. Wang, K. Bergersen, D. Worth, E. H. Wilson, **W. Zhong***. A Single Extracellular Vesicle (EV) Flow Cytometry Approach to Reveal EV Heterogeneity. *Angewandte Chemie, International Edition*, 2018, 57,15675-15680.

C-10. L. Holland, W. Zhong. Analytical developments in advancing safety in nanotechnology. *Analytical and Bioanalytical Chemistry*, 2018, 410, 6037-6039. (Editorial)

C-11. J. Y. Lee, H. Wang, G. Pyrgiotakis, G. M. DeLoid, Z. Zhang, J. Beltran-Huarac, P. Demokritou, **W. Zhong***. Analysis of lipid adsorption on nanoparticles by nanoflow liquid chromatography-tandem mass spectrometry. (**Invited Research Article**). *Analytical and Bioanalytical Chemistry* 2018, 410, 6155-6164.

C-12. Y. Liu, Y. Wang, S. Sedano, Q. Jiang, Y. Duan, W. Shen, J. Jiang, **W. Zhong***. Encapsulation of Ionic Nanoparticle Produces Reactive Oxygen Species (ROS)-Responsive Microgel Useful for Molecular Detection. *Chemical Communications*, 2018, 54, 4329-4332.

C-13. X. Fang, Y. Duan, G. B. Adkins, S. Pan, H. Wang, Y. Liu, **W. Zhong***. Highly Efficient Exosome Isolation and Protein Analysis by an Integrated Nanomaterial-Based Platform. *Analytical Chemistry*, 2018, 90, 4, 2787-2795.

C-14. Y. Si, Y. Bai, X. Qin, J. Li, **W. Zhong**, Z. Xiao, J. Li, Y. Yin. Alkyne-DNA-Functionalized Alloyed Au/Ag Nanospheres for Ratiometric Surface-Enhanced Raman Scattering Imaging Assay of Endonuclease Activity in Live Cells. *Analytical Chemistry*, 2018, 90, 3898-3905.

C-15. J. Lee, L. Perez, Y. Liu, H. Wang, R. Hooley, **W. Zhong***. Separation of Methylated Histone Peptides via Host-Assisted Capillary Electrophoresis. *Analytical Chemistry*, 2018, 90, 3, 1881-1888.

C-16. L.A. Jimenez, M.A. Gionet-Gonzales, S. Sedano, J.G. Carballo, Y. Mendez, **W. Zhong***. Extraction of MicroRNAs from Biological Matrices with Titanium Dioxide Nanofibers. *Analytical and Bioanalytical Chemistry*. 2018, 410, 1053–1060.

C-17. Y. Wang, J. Liu, G. B. Adkins, W. Shen, M. P. Trinh, L. Duan, J. Jiang, **W. Zhong***. Enhancement of the Intrinsic Peroxidase-Like Activity of Graphitic Carbon Nitride Nanosheets by ssDNAs and Its Application for Detection of Exosomes. *Analytical Chemistry*, 2017, 89, 12327-12333.

C-18. Y. Duan, Y. Liu, W. Shen, **W. Zhong***. Fluorescamine Labeling for Assessment of Protein Conformational Change and Binding Affinity in Protein-Nanoparticle Interaction. *Analytical Chemistry*, 2017, 89, 12160-12167.

C-19. X. Fang, Y. Liu, L. Jimenez, Y. Duan, G. B. Adkins, L. Qiao, B, **W. Zhong***. Rapid Enrichment and Sensitive Detection of Multiple Metal Ions Enabled by Macroporous Graphene Foam. *Analytical Chemistry*, 2017, 89, 21, 11758-11764.

C-20. Y. Liu, M. Mettry, A. D. Gill, L. Perez, **W. Zhong***, R.J. Hooley*. Selective Heavy Element Sensing with a Simple Host : Guest Fluorescent Array. *Analytical Chemistry*, 2017, 89, 20, 11113-11121.

C-21. Y. Liu, L. Perez, M. Mettry, A. D. Gill, G. J. O. Beran, R. J. Hooley*, and **W. Zhong***. Site-Selective Sensing of Histone Demethylase Activity with an Arrayed Deep Cavitand Fluorescence Displacement Assay. *Journal of American Chemical Society, 2017, 139, 10964–10967.*

C-22. X. Fang, Y. Duan, Y. Liu, G. Adkins, W. Zang, **W. Zhong**, L. Qiao*, B. Liu*. Photochemical Bionanoreactor for Efficient Visible-Light-Driven in Vitro Drug Metabolism. *Analytical Chemistry*, 2017, 89, 7365–7372.

C-23. Y. Wang, J. Liu, J.-H. Jiang,* and **W. Zhong***. Cobalt Oxyhydroxide Nanoflakes with Intrinsic Peroxidase Catalytic Activity and Its Application to Blood Glucose Detection. *Analytical and Bioanalytical Chemistry,* 2017*,* 409*,* 4225-4232.

C-24. Y. Liu, L. Perez, M. Mettry, A. D. Gill, S. R. Byers, C. J. Easley, C. J. Bardeen, **W. Zhong***, and R. J. Hooley*. Site Selective Reading of Epigenetic Markers by a Dual-Mode Synthetic Receptor Array. *Chemical Sciences*, 2017, 8, 3960-3970.

C-25. Ju Yong Lee, **W. Zhong***. Analysis of proteins and enzymes by Field Flow Fractionation (FFF). *Field-Flow Fractionation: Principles and Applications*. Editors: Céline Guéguen, Mohammed Baalousha, S. Kim R. Williams. Springer, New York, USA. 2017, In press.

C-26. Y. Liu, L. Perez, M. Mettry, C. J. Easley, R. J. Hooley* and **W. Zhong***. A Self-Aggregating Deep Cavitand Acts as a Fluorescence Displacement Sensor for Lysine Methylation. *Journal of American Chemical Society*, 2016, 138, 10746-9.

C-27. K. Flack, L. Jimenez, **W. Zhong***. Analysis of the distribution profiles of circulating microRNAs by Asymmetrical Flow Field Flow Fractionation. *Micro RNA Profiling: Methods and Protocols*. Editor: Sweta Rani. Springer, New York, USA. 2016, pp 161-168.

C-28. H. Wang, Y. Duan, **W. Zhong***. ZrO_2 Nanofiber as a Versatile Tool for Protein Analysis. *ACS Applied Materials & Interfaces*, 2015, 7, 26414−26420.

C-29. Q. Tang, M. Liu, F. Zhou, N. Wang, T. Deng, J. Li, R. Yang, **W. Zhong**, W. Tan. A novel AgNPs/DNA/TPdye Conjugate-based Two-photon Nanoprobe for GSH Imaging in Cell Apoptosis of Cancer Tissue. *Chemical Communications*, 2015, 51, 16810-16812.

C-30. S. Fang, Y. Liu, K. Yan, **W. Zhong***. Mitochondrion Targeting Fluorescent Probe for Imaging of Intracellular Superoxide Radical. *Chemical Communications*, 2015, 51, 7931 - 7934.

C-31. J. Ashby, Y. Duan, E. Ligans, M. Tamsi, **W. Zhong***. High-Throughput Profiling of Nanoparticle−Protein Interactions by Fluorescamine Labeling. *Analytical Chemistry*, 2015, 87, 2213-2219.

C-32. M. Y. Fong, W. Zhou, L. Liu, A. Y. Alontaga, M. Chandra, J. Ashby, A. Chow, S. T. O'Connor, S. Li, A. R. Chin, G. Somlo, M. Palomares, Z. Li, J. R. Tremblay, A. Tsuyada, G. Sun, M. A. Reid, X. Wu, P. Swiderski, X. Ren, Y. Shi, M. Kong, **W. Zhong**, Y. Chen, S. E. Wang. Breast-cancer-secreted miR-122 reprograms glucose metabolism in premetastatic niche to promote metastasis. *Nature Cell Biology*, 2015, 17, 183-194.

C-33. Y. Ghang, L. Perez, M. A. Morgan, F. Si, O. M. Hamdy, C. N. Beecher, C. K. Larive, R. R. Julian, **W. Zhong**, Q. Cheng, R. J. Hooley. Anionic deep cavitands enable the adhesion of unmodified proteins at a membrane bilayer. *Soft Matter*, 2014, 10, 9651-9656.

C-34. J. Ashby, K. Flack, L. Jimenez, Y. Duan, A.-K. Khatib, G. Somlo, S. E. Wang, X. Cui, **W. Zhong***. Distribution Profiling of Circulating MicroRNAs in Serum. *Analytical Chemistry*, 2014, 86, 9343-9349.

C-35. Y. Liu, D. Yan, **W. Zhong***. Mechanistic Study on the Reduction of SWCNT-induced Cytotoxicity by Albumin Coating (**Invited Research Article; Inside Cover**). *Particle & Particle Systems Characterization*, 2014, 31, 1244–1251.

C-36. Y. Mei, S. Yang, Z. Peng, C. Liu, J. Li*, **W. Zhong**, R. Yang, W. Tan. Two-Photon Graphene Oxide/Aptamer Nanosensing Conjugate for In Vitro or In Vivo Molecular Probing. *Analytical Chemistry*, 2014, 86, 3548-3554.

C-37. J. Ashby, S. Pan, **W. Zhong***. Size and Surface Functionalization of Iron Oxide Nanoparticles Influence the Composition and Dynamic Nature of Their Protein Corona. *ACS Applied Materials & Interfaces*, 2014, 6, 15412-15419.

C-38. J. Ashby, S. Schachermeyer, Y. Duan, L. Jimenez, **W. Zhong***. Probing and Quantifying DNA-protein Interactions with Asymmetrical Flow Field-Flow Fractionation. *Journal of Chromatography, A,* 2014, 1358, 217-224.

C-39. S. Zeng, M. Huang, Chia-en A. Chang*, **W. Zhong***. Protein Binding for Detection of Small Changes on Nanoparticle Surface (**Back Cover**). *Analyst*, 2014, 139, 1364 - 1371.

C-40. C. Shi, Q. Liu, C. Ma*, **W. Zhong***. Exponential Strand-Displacement Amplification for Detection of MicroRNAs. *Analytical Chemistry*, 2014, 86, 336–339.

C-41. J. Li, Y. Jia, J. Zheng, **W. Zhong**, G. Shen, R. Yang, W. Tan. Aptamer degradation inhibition combined with DNAzyme cascade-based signal amplification for colorimetric detection of proteins. *Chemical Communications*, 2013, 49, 6137-6139.

C-42. J. Ashby, S. Schachermeyer, **W. Zhong***. Dissociation-Based Screening of Nanoparticle-Protein Interaction via Flow Field-Flow Fractionation. *Analytical Chemistry*, 2013, 85, 7494-7501.

C-43. S. Schachermeyer, J. Ashby, **W. Zhong***. Analysis of Aptamer-Protein Interaction by Asymmetrical Flow Field Flow Fractionation. *Journal of Chromatography A*, 2013, 1295, 107-113.

C-44. J. Li, Y. Jia, J. Zheng, **W. Zhong**, G. Shen, R. Yang, W. Tan. Aptamer degradation inhibition combined with DNAzyme cascade-based signal amplification for colorimetric detection of proteins. Chemical Communications, 2013, 49, 6137-6139.

C-45. J. Yao, K. Flack, L. Ding, **W. Zhong***. Tagging the rolling circle products with nanocrystals clusters for cascade signal increase in the detection of miRNA. *Analyst*, 2013, 138, 3121-3125.

C-46. R. Zhong, K. Flack, **W. Zhong***. Automatic Small RNA Extraction and Processing by a Multichannel/Multiwell Chip. *Analyst*, 2013, 137, 5546-5552.

C-47. L. Ren, D. Yan, **W. Zhong***. Electron-Transfer via Single-Walled Carbon Nanotube in Enzymatic Redox Reaction. *Carbon*, 2012, 50, 1303-1310.

C-48. J. Yao, X. Han, S. Zeng, **W. Zhong***. Detection of Femtomolar Proteins by Nonfluorescent ZnS Nanocrystal Clusters. *Analytical Chemistry,* 2012, 84, 1645–1652.

C-49. S. Schachermeyer, J. Ashby, M. Kwon, **W. Zhong***. Impact of Carrier Fluid Composition on Recovery of Nanoparticles and Proteins in Flow Field Flow Fractionation. *Journal of Chromatography A*, 2012, 1264, 72-79.

C-50. S. Schachermeyer, J. Ashby, **W. Zhong***. Advancements in Field Flow Fractionation for the Analysis of Biomolecules: Instrument Design, Miniaturization, and Hyphenation (**Invited Trend Article**). *Analytical and Bioanalytical Chemistry*, 2012, 404, 1151-1158.

C-51. S. Schachermeyer, **W. Zhong***. Chapter 9: Flow Field Flow Fractionation: Analysis of Biomolecules and Their Complexes. *Field-Flow Fractionation in Biopolymer Analysis.* (Editors: Karin D. Caldwell & Kim R. Williams) Springer, New York, USA, 2012, 127-138.

C-52. K. Parvatiyar, Z. Zhang, R. M. Teles, S. Ouyang, Y. Jiang, Z-J. Liu, S. SIyer, S. Zeng, **W. Zhong**, R. L. Modlin, Y. Liu, G. Cheng*. DDX41 Recognizes Bacterial Secondary Messengers Cyclic di-GMP and Cyclic di-AMP to Activate a Type I Interferon Immune Response. *Nature Immunology*, 2012, 13, 1155-1161.

C-53. N. Li, S. Zeng, L. He, **W. Zhong***. Exploration of the Possible Binding Sites of Nanoparticles on Protein. *Analytical Chemistry*, 2011, 83, 6929-6934.

C-54. H. Zhou, J. Lin, A. Johnson, R. L. Morgan, **W. Zhong**, W. Ma*. Pseudomonas Syringae Type III Effector HopZ1 Targets a Host Enzyme to Suppress Isoflavone Biosynthesis and Promote Infection in Soybean. *Cell Host & Microbe*, 2011, 9, 177-186.

C-55. J. Yao, J. Li, J. Owens, **W. Zhong***. Combing DNAzyme with Single-walled Carbon Nanotubes for Detection of Pb(II) in Water. *Analyst,* 2011, 136, 764-768.

C-56. N. Li, Z. Shang, L. He, **W. Zhong***. Probing Nanoparticle-Protein Interaction by Capillary Electrophoresis. *Analytical Chemistry*, 2010, 82(17), 7460-7466. (Featured on SeparationsNow.com as leading new development in electrophoresis)

C-57. N. Li, **W. Zhong***. Chapter 5: Capillary Electrophoresis of Nucleic Acids at the Single-Cell Level*. Chemical Cytometry: Ultrasensitive analysis of single cells.* (Editor: Chang Lu) Wiley-VCH, Weinheim, Germany, 2010, 75-91.

C-58. L. N. Cella, P. Sanchez, **W. Zhong**, N. V. Myung, W. Chen, A. Mulchandani*. Nano Aptasensor for Protective Antigen Toxin of Anthrax. *Analytical Chemistry*, 2010, 82, 2042-2047.

C-59. J. Yao, S. Schachemeyer, Y. Yin, **W. Zhong***. Cation Exchange in ZnSe Nanocrystals for Signal Amplification in Bioassays. *Analytical Chemistry,* 2010, 83, 402-408.

C-60. Z. Lu, M. Ye, N. Li, **W. Zhong**, Y. Yin*. Self-Assembled TiO_2 Nanocrystal Clusters for Selective Enrichment of Intact Phosphorylated Proteins. *Angewandte Chemie, International Edition,* 2010, 49, 1862-1866.

C-61. L. Ren, **W. Zhong***. Oxidation Reactions Mediated by Single-walled Carbon Nanotubes in Aqueous Solution. *Environmental Science & Technology*, 2010, 44(18), 6954-6958.

C-62. J. Li, S. Schachermeyer, Y. Wang, Y. Yin, **W. Zhong***. Detection of MicroRNA by Fluorescence Amplification Based on Cation-Exchange in Nanocrystals. *Analytical Chemistry*, 2009, 81, 9723-9729.

C-63. J. Li, J. Yao, **W. Zhong***. Membrane Blotting for Rapid Detection of Mercury (II) in Water. *Chemical Communications*, 2009, 33, 4962-4964.

C-64. J. Li, T. Zhang, J. Ge, Y. Yin, **W. Zhong***. Fluorescence Amplification by Cation Exchange in Ionic Nanocrystals. *Angewandte Chemie, International Edition,* 2009, 48, 1588-1591.

C-65. N. Li, C. Jablonowski, **W. Zhong***. Stand-Alone Rolling Circle Amplification Combined with Capillary Electrophoresis for Specific Detection of Small RNA. *Analytical Chemistry*, 2009, 81, 4906-4913.

C-66. L. Ren, H. K. Kim, **W. Zhong***. Capillary Electrophoresis-Assisted Identification of Peroxyl Radical Generated by Single-Walled Carbon Nanotubes in a Cell-Free System. *Analytical Chemistry*, 2009, 81, 5510-5516.

C-67. (Review) **W. Zhong***. Nanomaterials in Fluorescence-based Biosensing. *Analytical and Bioanalytical Chemistry*, 2009, 394, 47-59. (Invited paper for the special issue of "Young Investigator in Analytical and Bioanalytical Science"; listed among the 2009 Top 10 most viewed articles published in this journal)

C-68. N. Li, A. Nguyen, J. Diedrich, **W. Zhong***. Separation of miRNA and Its Methylation Products by Capillary Electrophoresis. *Journal of Chromatography A*, 2008, 1202, 220-223.

C-69. J. Li, J. Ge, Y. Yin, **W. Zhong***. Multiplexed Affinity-Based Protein Complexes Purification. *Analytical Chemistry*, 2008, 80, 7068-7074.

C-70. N. Li, J. Li, **W. Zhong***. CE Combined with Rolling Circle Amplification for Sensitive DNA Detection. *Electrophoresis*, 2008, 29, 424-432.

C-71. J. Li, **W. Zhong***. A Two-dimensional Suspension Array System by Coupling Field Flow Fractionation to Flow Cytometry. *Journal of Chromatography A,* 2008, 1183, 143-149.

C-72. J. Li, **W. Zhong***. Typing of Multiple Single-Nucleotide Polymorphisms Using a Microsphere-based Rolling Circle Amplification Assay. *Analytical Chemistry*, 2007, 79, 9030-9038.

Before Coming to the University of California, Riverside

C-73. **W. Zhong**, Y. Shou, T. Yoshida, B. Marrone*. *Bacillus anthracis, B. cereus* and *B. thuringiensis* Differentiation Using Pulsed Field Gel Electrophoresis. *Applied and Environmental Microbiology*, 2007, 73 (10), 3446-3449.

C-74. J. He, **W. Zhong**, A. Tang, X. Yan, C. Lewis, V. Majidi, W. Hang*. A Fluorescence Detection Scheme for Ultra Large Molecules after Gas Phase Separation. *Talanta*, 2007, 71(5), 2126-2128.

C-75. J. He, **W. Zhong**, M. Cynthia, W. Hang*. Laser Ablation and Ionization Time-of-flight Mass Spectrometer with Orthogonal Sample Introduction and Axial Field rf-only Quadrupole Cooling. *Spectrochimica Acta, Part B: Atomic Spectroscopy*, 2006, 61B (2), 220-224.

C-76. X.Yan*, **W. Zhong**, A. Tang, W. Hang. J. Nolan, Multiplexed Microsphere-based Flow Cytometric Immunoassay for Detection and Differentiation of Influenza Viruses. *Analytical Chemistry*, 2005, 77 (23), 7673-7678.

C-77. W. Hang*, L. Zhu, **W. Zhong**, and C. Mahan. Determination of Ultra-trace Level of Actinides from Urine Matrix Using Extraction Chromatography Coupled to ICP-Q-MS. *Journal of Analytical Atomic Spectrometry*, 2004, 19, 1-8.

C-78. **W. Zhong**, and E.S. Yeung*. Study of Total RNA Expression Profile among Human Tissues by Capillary Gel Electrophoresis and Multivariate Analysis. *Analytical Chemistry*, 2003, 75(17), 4415-4422.

C-79. **W. Zhong**, and E.S. Yeung*. Combinatorial Enantiomeric Separation of Diverse Compounds Using Capillary Array Electrophoresis. *Electrophoresis*, 2002, 23(17), 2996-3005.

C-80. Y. Markouchine, **W. Zhong**, G.J. Small, E.L. Cavalieri, and R. Jankowiak*. Identification of Catechol Estrogen Quinones Derived DNA Adducts and Conjugates in Human Tissue Extracts. *Chemical Research in Toxicology*, 2003, 16(9), 1107-1117.

C-81. Y. He, **W. Zhong**, and E.S. Yeung*. Multiplexed On-column Protein Digestion and Capillary Electrophoresis for Comprehensive Peptide Mapping. *Journal of Chromatography B*, 2002, 782 (1-2), 331-341.

C-82. **W. Zhong**, and E.S. Yeung*. Multiplexed Capillary Electrophoresis for DNA Sequencing with Ultra Violet Absorption Detection. *Journal of Chromatography A*, 2002, 960(1-2), 229-239.

D. Patents and Invention Disclosures

D-1. **W. Zhong** and Y. Yin (UCR colleague). “Signal Amplification Through the Gentle Release of Zn2+ from ZnSe Nanocrystals for Detection of Biomolecules.” UC Disclosure case No. 2011-246-1, Oct. 2010.

D-2. **W. Zhong** and R. Zhong (postdoc). “Valveless Microfluidic Device.” UC Disclosure case No. 2012-301-1. USSN 61/558,851. Patent Issued, 01/2017.

D-3. **W. Zhong**, J. Ashby (graduate student), and K. Flack (graduate student). “Methods to Determine the Distribution Profiles of Circulating MicroRNAs.” UC Disclosure case No. 2015-080-1. Provisional Patent filed on Sept. 03, 2014; Non-provisional filing done on Sept. 03, 2015, PCT/US2015/048341; entered National Phase 03/2017, elected the US and China as the entry nations.

D-4. **W. Zhong**, L. A. Jimenez (graduate student). “Extraction of Short Nucleic Acids by Nanofibers.” UC Disclosure case No. 2018-130. USSN 62/566,357. PCT filing in progress.

E. Research Support

Project Title (Role)	**Agency**	**Period Covered**	**Amount**	**Status**
Profiling extracellular vesicles by single particle counting (PI)	UC Cancer Research Coordinating Committee (CRCC)	01/01/2019 – 12/31/2019	$75,000	Current
Synthetic Receptor-Based Arrays for Sensing Post-Translationally Modified Proteins and Peptides (PI)	NSF	07/01/2017-06/30/2020	$495,000	Current
Nano-response: Immune stimulation, microbiome perturbation and impacts from	NIH/NIEHS	09/31/16 – 08/31/21	$799,727	Current

protein corona (PI)				
3-Dimensional profile of circulating miRNA for early cancer detection (PI)	NIH/NCI	04/23/15 – 03/31/19	$1,246,835	Current
Comprehensive Profiling of Extracellular RNA Biomarkers of Alcohol Consumption (Co-I)	NIH/NIA	04/01/18 – 03/31/20	$53,300	Current
Development of the prototype of the microRNA Differential Isolation Platform (PI)	UC Riverside	07/01/16-06 /30/17	$35,000	Completed
CAREER: Signal Amplification by Cation Exchange in Ionic Nanocrystals (PI)	National Science Foundation	02/01/11 - 01/31/16	$550,000	Completed
Discovery of virus-binding aptamers (PI)	UC Riverside	07/01/15-06 /20/16	$11,000	Completed
Direct Recruitment of Ribosomes by RNA Polymerase might guide the Evolution of Bacterial Pathogens (Co-I)	UC Riverside	07/01/14-06 /30/15	$70,000	Completed
Nanomaterials coated with antigenic proteins as immunostimulatory complexes (PI)	UC Riverside	07/01/14-06 /30/15	$50,000	Completed
Impact of Protein Corona on Nanotube-Conjugated CpG Immunotherapy for Glioma (Co-PI)	City of Hope and UC Riverside	02/01/13-01 /31/15	$100,000	Completed
Discovery of Virus-Binding Aptamers (PI)	UCR IIGB Core Instrument Facility	12/14-05/15	$5,000	Completed
Study Protein-Nanomaterial Interactions and Their Impacts on Protein Activity (PI)	National Institutes of Health	09/01/10 -08/30/12	$415,775	Completed
One-step miRNA Analysis for Study of Cancer Development (PI)	Cancer Research Coordinating Committee, UC	07/01/11-06 /30/12	$50,000	Completed

High-Throughput Screening of siRNA Expression Using Rolling Circle Amplification (PI)	The Institute for Integrative Genome Biology (IIGB) of UCR	11/01/07-10 /30/08	$50,000	Completed

F. Professional Services

Service on Professional Board

Analytical Chemistry Feature Panel, 2015-2018

Member of the Steering Board for International Symposia on Field and

Flow-based Separations

Analytical and Bioanalytical Chemistry, International Advisory Board, 2017-present

Chair for organization of the technical programs from the AES Electrophoresis Society in SciX 2021

Proposal review

National Institute of Health:

Member, Enabling Bioanalytical and Imaging Technologies (EBIT) Study Section, Center for Scientific Review, Member, 2018-2022

Ad-hoc member for EBIT, 2012, 2015, 2016, 2017; Small Business: Biological Chemistry, Biophysics and Drug Discovery Study Section 2013, 2014, 2016, 2017; and Cancer Biomarker Study Section 2017, 2018.

National Science Foundation:

Ad-hoc reviewer, *2008-2012;* Panelist for CBET and Chemistry Division, 2011-2018.

NASA:

Panelist, 2016.

Ad-hoc reviewer for Hongkong research council 2012-2017; Korean National Science Foundation 2015; Deutsche Forschungsgemeinschaft (DFG) 2016.

Teaching and service at UCR

Director for the Environmental Toxicology Graduate Program, 2018-present

Graduate advisor for the Environmental Toxicology Graduate Program, 2012-2018

Undergraduate advisor for Chemistry, 2016-2018

Instructor for Advanced Analytical Separation, Advanced Bioanalytical Chemistry, Quantitative Analysis, Instrumental Methods and Analysis, General Chemistry

Organized Symposia at Conferences

F-1. Pacifichem 2020, Hawaii, December 2020, *Understand and Design Safe Nano-Bio Interfaces for Material, Medicine, and Environment*.

F-2. Pacifichem 2020, Hawaii, December 2020, *Synthetic Receptors in Biological Systems.*

F-3. FACSS SciX 2019, Palm Spring, October 2019, technical programs from The AES Electrophoresis Society, *Biological and Pharmaceutical Applications.*

F-4. ACS Fall 2019 National Meeting & Exhibition, San Diego, August 2019, *Exploration of the Nano-Bio Interface with Analytical Tools.*

F-5. ACS Fall 2019 National Meeting & Exhibition, San Diego, August 2019, *Study of Circulating, Cell-free Biomarkers with Analytical Tools.*

F-6. 253rd ACS National Meeting & Exhibition, San Francisco, April 2017, ACS-DAC, *Advanced Materials, Discovery, Characterization & Safety*.

F-7. The Pittsburgh Conference 2017. ACS-DAC, *Analytical Advances in Sustainable and Safe Nanotechnology*.

F-8. 251st ACS National Meeting & Exhibition, San Diego, March 2016. *Sampling and Processing of Biological Particles Enabled by Micro- or Nano-fluidics.*

F-9. 2016 Annual Meeting for the Society of Western Analytical Professors (SWAP). Organizer. Riverside, CA, January 2016.

F-10. Pacifichem 2015, Honolulu, HI, December 2015. Organized two symposia: “New Tools and Methodologies for the Characterization of Biomolecular Interactions”; and “Innovation in Chemical Sensing and Separation Systems toward Advanced Chemical Analysis”.

F-11. 17th International Symposium on Field and Flow-based Fractionation. Organization Committee. Salt Lake City, UT, October 2014.

F-12. The Pittsburgh Conference 2014, Conferee Networking Session: Analytical Chemistry at the Nano-Bio Interface. Chicago, IL, March 2014.

F-13. ACS 87th Colloid & Surface Science Symposium. Riverside, CA. June 2013. *Sensing for Biomedical and Environmental Applications.*

F-14. (Co-Chair; lead organization of all four electrophoresis symposia) Federation of Analytical Chemistry and Spectroscopy Societies Annual Conference (SCIX 2012), Kansas City, Missouri, October 2012.

F-15. Federation of Analytical Chemistry and Spectroscopy Societies Annual Conference (FACSS XXXVII), Reno, Nevada, October 2011. *Bioparticle Analysis Employing Electrokinetic Techniques*.

F-16. 241st ACS National Meeting & Exhibition, Anaheim, California, March 2011. *Separation Sciences and Supramolecular Assembly: Analysis and Applications.*

F-17. Federation of Analytical Chemistry and Spectroscopy Societies Annual Conference (FACSS XXXVI), Raleigh, North Carolina, October 2010. *Probing Interactions Between Biomolecules and Nanomaterials.*

F-18. The Pittsburgh Conference (PittCon), Orlando, Florida, March 2010. *Analytical Chemistry for the Study of Nanotoxicity*. (Accepted symposium proposal, and reported as a cover story in Chemical & Engineering News)

F-19. Federation of Analytical Chemistry and Spectroscopy Societies Annual Conference (FACSS XXXV), Louisville, Kentucky, October 2009. *Multifunctional Nanostructure: Fabrication and Applications*.

Reviewed Journal Articles

ACS Applied Materials & Interfaces
Analyst
Analytical and Bioanalytical Chemistry
Analytical Biochemistry
Analytical Chemistry
Analytical Method
Angewandte Chemie, International Edition
Bioanalysis
Biochemistry
Biomedical Chromatography
Chemical Communications
Chemical Science
Chemistry & Biology
Colloids and Surfaces A: Physicochemical and Engineering Aspects
Electrophoresis
Environmental Chemistry
European Journal of Cancer
Journal of American Chemical Society
Journal of Chromatography A
Journal of Chromatography B
Journal of Material Science
Journal of Separation Science
Langmuir
Nanoscale
Nature Protocol
Particle & Particle Systems Characterization
PNAS
PLOS One
RSC Advances
Scientific Report
Sensors
Sensors & Actuators B. Chemica
Talanta

G. Invited Presentations

At Conferences

G-1. ChinaNano2019, The 8th International Conference on Nanoscience & Technology, Beijing, August 2019*. Complex Interactions between Nanomaterials and Biomolecules Elucidated with Advanced Analytical Tools*

G-2. The 10th Environmental Chemistry Conference of China, Tianjin, August, 2019*. Chemical Noses for Analysis of Histone Modification.*

G-3. The 14th Sino-US Forum on Nanoscale Science and Technology, Hefei, July, 2018. *A Single Extracellular Vesicle (EV) Flow Cytometry Approach to Reveal EV Heterogeneity.*

G-4. *4*th International Conference on Energy and Biological Materials. Hefei, China. September, 2018. *Complex Interactions between Nanomaterials and Biomolecules Elucidated with Advanced Analytical Tools.*

G-5. The 2018 ACS Fall National Meeting and Exhibition. Boston, MA. August, 2018. *Peroxidase-mimicking microgels fabricated by encapsulation of ionic nanoparticles and their applications in biomarker detection.*

G-6. 2018 Annual Meeting for the Society of Western Analytical Professors (SWAP). Seattle, WA. January, 2018. *Single vesicle counting enabled by DNA nanostructures.*

G-7. International Symposium on Field and Flow-based Fractionation 2018. Columbia, South Carolina. April, 2018. *Asymmetrical flow field flow fractionation for analysis of biological macromolecules.*

G-8. International Society of Extracellular Vesicles 2018 Annual Meeting, Barcelona, Spain, May 2018. *Single vesicle counting enabled by DNA nanostructures.*

G-9. The 57th Annual Meeting of Society of Toxicology, San Antonio, May 2018. *Biomolecule Corona Formed on Nanomaterials Present in Biological Matrices.*

G-10. *The 46th International Symposium on High Performance Liquid Phase Separations and Related Techniques (HPLC 2017 Jeju), Jeju, Korea, 2017. Asymmetrical flow field flow fractionation for analysis of extracellular vesicles.*

G-11. 254th ACS National Meeting & Exhibition, Washington DC, August 2017. *Synthetic Receptor-Enabled Capillary Electrophoresis for Analysis of Protein Methylation.*

G-12. 253rd ACS National Meeting & Exhibition, San Francisco, April 2017. *Separation and Fluorescence – Analytical Tools for Study of Protein-Nanoparticle Interaction.*

G-13. The Pittsburgh Conference, Chicago, March 2017. *Separation and Fluorescence – Analytical Tools for Study of Protein-Nanoparticle Interaction.*

G-14. ACS Publications Symposium. Innovation in Molecular Science. Beijing, China, October, 2016. *Deep Cavitand Acts as a Fluorescence Displacement Sensor for Lysine Methylation.*

G-15. 251st ACS National Meeting & Exhibition, San Diego, March 2016. *On Chip Extraction of Circulating MicroRNA from Various Carriers.*

G-16. 2016 Annual Meeting for the Society of Western Analytical Professors (SWAP). Riverside, CA, January 2016. *A Synthetic Receptor-based Sensor for Detection of Lysine Methylation in Proteins.*

G-17. 43rd International Symposium on High Performance Liquid Phase Separations and Related Techniques (HPLC2015). *On-Chip Separation of Circulating microRNAs Bound to Various Carriers.*

G-18. Revolutionizing Biology and Medicine with Advances in Nanotechnology. Work Shop, Changsha, Hunan, China, June 2015. *Integration of Bioanalytical Chemistry and Nanotechnology*.

G-19. 31st International Symposium on MicroScale Bioseparations (MSB2015). Shanghai, China, May 2015. *Open-Channel Separation Hyphenated with Nanofiber-based Molecular Extraction for Analysis of Biological Complexes*.

G-20. ACS 248th National Meeting. San Francisco, CA, August 2014. *Dissociation-Based Screening of Nanoparticle (NP)-Protein Interaction via Flow Field-Flow Fractionation (F4).*

G-21. 2014 6th International Symposium on Bioanalysis, Biomedical Engineering and Nanotechnology (ISBBN 2014). Hunan, China, June 2014. *Potential Contribution of Protein Corona to the Efficacy of Nanomedicines.*

G-22. Federation of Analytical Chemistry and Spectroscopy Societies Annual Conference (SCIX 2012), Kansas City, Missouri, October 2012. *Free-solution Separation for Study of Molecular Interaction*.

G-23. Spring 2012 ACS National Meeting, San Diego, CA, March 2012. *Capillary Electrophoresis in the Study of Nanoparticle-Protein Interaction*.

G-24. Federation of Analytical Chemistry and Spectroscopy Societies Annual Conference (FACSS XXXVII), Reno, Nevada, October 2011. *Capillary Electrophoresis for Study of Nanoparticle-Protein Interaction.*

G-25. Joint conference of the 57th International Conference on Analytical Sciences and Spectroscopy (ICASS) and the 3rd Canada-China Analytical Chemistry Conference (CCACC), Canada, August 2011*. Sensing by Cation Exchange in Ionic Nanocrystals.*

G-26. The International Symposium on Field- and Flow-based Separation (FFF), May 2011. *Study Nanoparticles and Their Interaction with Proteins Using Open-Column Separation Technologies.*

G-27. Sino-US Symposium on Separation Science, San Diego, CA, May 2011. *Analytical Tools for the Study of Nanoparticle-Protein Interaction.*

G-28. 241st ACS National Meeting & Exhibition, Anaheim, California, March 2011. *Study Nanoparticle-Protein Interaction with Capillary Electrophoresis and Beyond.*

G-29. Pacifichem 2010, Honolulu, Hawaii, December 2010. *Open-Column Separation Techniques in Characterization of the Protein-Nanoparticle Complexes.*

G-30. Federation of Analytical Chemistry and Spectroscopy Societies Annual Conference (FACSS XXXVI), Raleigh, North Carolina, October 2010. *Measuring Affinity Between Proteins and Nanoparticles Using Capillary Electrophoresis.*

G-31. The Pittsburgh Conference, Orlando, Florida, March 2010*. Study of Protein-Nanoparticle Interaction Using Free Solution-Based Separation Techniques*.

G-32. Federation of Analytical Chemistry and Spectroscopy Societies Annual Conference (FACSS XXXV), Louisville, Kentucky, October 2009. *Applications of Ionic Nanocrystals in Biosensing.*

At Universities

G-33. University of Washington, Seattle, WA, October 2018.

G-34. ShanghaiTech University, September, 2018.

G-35. University of Science and Technology of China, Hefei, China. July 2018.

G-36. Ganzhou Normal University, Jiangxi, China. July 2018.

G-37. Dalian Institute of Chemical Physics, China, July 2018.

G-38. Soochow University, China, July 2018.

G-39. Arizona State University, AZ, March 2018.

G-40. University of Iowa, Iowa City, IA, December 2017.

G-41. Iowa State University, Ames, IA, December 2017.

G-42. Zhejiang Academy of Agricultural Sciences, Hangzhou, November, 2017.

G-43. Wichita State University, Kansas, October 2017.

G-44. School of Public Health, Harvard University, Boston, MA, October 2017.

G-45. Northeastern University, Boston, MA, September 2017

G-46. West Virginia University, WV, August 2017.

G-47. Hunan University, Hunan, China, July 2017.

G-48. Zhongnan University, Hunan, China, July 2017.

G-49. Wuhan University, Wuhan, China, July 2017.

G-50. Sun Yat-Sen University, Guangzhou, China, October 2016.

G-51. Macquarie University, Sydney, Australia, June 2015.

G-52. University of Science and Technology of China, Hefei, China. May 2015.

G-53. Nanjing University, Nanjing, China. May 2015.

G-54. HongKong University of Science and Technology, HongKong, China. August 2014.

G-55. HongKong Baptist University, HongKong, China. August 2014.

G-56. Hunan Normal University, Changsha, China. May 2014. *Separation Science for Analysis of Molecular Interaction.*

G-57. Old Dominion University, Northfolk, VA. March 2014. *The Biological Signatures of Nanoparticles.*

G-58. Shandong University, Jinan, China. July 2013. *Analytical Chemistry at the Nano-Bio Interface.*

G-59. Xiamen University, Xiamen, China. August 2013. *Analytical Chemistry at the Nano-Bio Interface.*

G-60. University of California, Irvine, Department of Chemistry and Biochemistry. October 18th, 2011. *Analytical Chemistry at the Nano-Bio Interface.*

G-61. University of Minnesota, Department of Chemistry. September 22nd, 2011. *Understanding the Nano-Bio Interface with Analytical Technologies.*

G-62. University of Kansas, Department of Chemistry. September 19th, 2011. *Understanding the Nano-Bio Interface with Analytical Technologies.*

G-63. Brigham Young University, Department of Chemistry and Biochemistry. September 2nd, 2011. *Probing Protein-Nanoparticle Interaction with Analytical Technologies.*

G-64. University of Utah, Department of Chemistry. September 1st, 2011. *Probing protein-nanoparticle Interaction with Analytical Technologies.*

G-65. University of Alberta, Department of Chemistry. August 28th, 2011*. Understanding the Nano-Bio Interface with Analytical Technologies.*

G-66. University of California, Davis, Department of Chemistry. June 1st, 2011. *Analytical Chemistry at the Nano-Bio Interface.*

G-67. University of Arizona, Department of Chemistry and Biochemistry. May 11th, 2011. *Gaining Better Understanding of the Nano-Bio Interface with Analytical Technologies.*

G-68. California State University, Long Beach, Department of Chemistry and Biochemistry. March 11th, 2011. *Study Nanoparticle-Protein Interaction with Analytical Tools.*

G-69. San Diego State University, Department of Chemistry and Biochemistry. February 4th, 2011. *Analytical Chemistry at the Nano-Bio Interface.*

G-70. California State University, Los Angeles, Department of Chemistry and Biochemistry. January 25th, 2011. *Analytical Chemistry at the Nano-Bio Interface.*

G-71. North Carolina State University, Department of Chemistry. October 22nd, 2010. *Understanding the Nano-Bio Interface with Analytical Tools.*

G-72. California State University, San Bernardino, Department of Chemistry and Biochemistry. October 7th, 2010. *Analytical Chemistry at the Nano-Bio Interface.*

G-73. California State University, Fullerton, Department of Chemistry and Biochemistry. May 7th, 2009. *What Analytical Chemists Can Do with Nanomaterials?*

H. Advisees

Graduate Students

Ni Li, Ph.D.	Research Scientist, Abbott Laboratories 09/2006-06/2011, Chemistry
Lei Ren, Ph.D.	Research Scientist, Bokai Pharma 09/2007-08/2012, Environmental Toxicology Program

	2011-2012 Dissertation Year Program Fellowship
Jingjing Yao, Ph.D.	Biopharma, Inc.
	09/2007-08/2013, Chemistry
Samantha Schachermeyer, Ph.D.	Lecturer, University of Toledo, Oregon
	01/2008-12/2013, Chemistry
Shang Zeng, Ph.D.	Amgen, Inc.
	09/2009-08/2014, Chemistry
Jonathan Ashby, Ph.D.	Assistant professor, Mount Holyoke College
	01/2010-08/2014, Chemistry NSF Graduate Research Fellowship, 06/11-05/14
Kenneth Flack, Ph.D.	Hewlett Packard, Inc.
	01/2011-12/2015, Chemistry
Yang Liu, Ph.D.	Yale University, Postdoc
	09/2012-09/2017, Environmental Toxicology Program
Luis Jimenez, Ph.D.	Merck Inc., Postdoc
	09/2012-03/2018, Program of Biomedical Sciences
Yaokai Duan, Ph.D.	09/2013-09/2018, Chemistry
Jiwon Lee	09/2014-present, Chemistry
Gary Brent Adkins	07/2015-present, Chemistry
Michael Trihn	07/2015-present, Chemistry
Kaizhu Guo	07/2016-present, Chemistry
Roxana Coreas	07/2016-present, Environmental Toxicology Program
Qiaoshi Jiang	07/2017-present, Environmental Toxicology Program
Junyi Chen	07/2018-present, Environmental Toxicology Program
Zongbo Li	07/2018-present, Chemistry

Postdocs

Jishan Li	12/2006-02/2010; Professor, College of Chemistry and Chemical Engineering, Hunan University, China
Xiaogang Han	09/2010-08/2011; Postdoc, University of Maryland, College Park
Runtao Zhong	07/2010-02/2012
Hui Wang	05/2012-08/2013
Ju-Yong Lee	08/2015-06/2018

Wen Shen	01/2016-12/2017
Xiaoni Fang	07/2016-04/2017
Yongzan Zheng	08/2017-present
Linlin Wang	09/2018-present

Visiting Scholars/Students

Liang Ding	08/2011-02/2012; Professor, School of Medicine, Hebei University
Chao Shi	05/2012-02/2013; Professor, Qingdao University of Science and Technology
Zhigang Wang	08/2012-04/2013; Professor, Yang Zhou University
Xiaofeng Chen	09/2014-02/2015; Professor, Yang Zhou University
Fang Chen	09/2014-08/2015; Professor, Hua Zhong University of Science & Technology
Ting Deng	03/2015-present; Associate Professor, Hunan University
Fang Si	12/2013-02/2015; Visiting Student, Dong Hua University
Yumin Wang	09/2016-09/2017; Visiting Student, Hunan University
Hua Wang	10/2016-10/2017; Professor, Yancheng University

Undergraduate Students

Long-term Participants in Group Research:

Anh Nguyen	07/2007-06/2009; co-author in C-18
Hong Kim	07/2007-06/2009; co-author in C-17
Sonja Kress	NSF International REU Program, summer 2007
Carolyn Jablonowski	NSF REU Program, summer 2008; co-author in C-14
Jimmy Vo	Analytical Assistant Chemist, Mitsui Chemical Group 07/2009-08/2012 Kuwana-Sawyer award for undergraduate research in Analytical Chemistry, 2011 Undergraduate Research Grant of UCR, 07/2010-05/2011
Michael Pham	07/2011-06/2013 (Honor student thesis program)
Erik Ligans	04/2013-12/2014 (Honor student thesis program)
Merissa Gonzales	08/2013-present (MARC*U program)
Michael Tamsi	08/2013-07/2014
Abdel-Kareem Khatib	05/2014-09/2014

Nancy Ortega	05/2014-05/2015
Joshua Berlarde	05/2014-07/2018
Sabrina Sedano	05/2015-07/2018
Yomara Mendez	05/2015-07/2018
Erica Sun	04/2017-present
Allison Win	09/2018-present

I. Professional Affiliations

American Chemical Society; American Association for the Advancement of Science